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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/373,837	08/13/1999	METIN AYDEMIR	RAL919990005US1	2996

45503 7590 01/19/2010

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EXAMINER	
PHAN, MAN U	

ART UNIT	PAPER NUMBER
2475	

MAIL DATE	DELIVERY MODE
01/19/2010	PAPER

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/373,837
Filing Date: 13 August 1999
Appellant(s): Aydemir et al.

Andrew J. Dillon

For Appellant

EXAMINER'S ANSWER

This is in response to appellant's brief on appeal filed December 30, 2005.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is incorrect. A correct statement of the status of the claims is as follows:

This appeal involves claim 1-6, 8-18 and 20-25.

Claims 1-6, 8-18 and 20-25 are rejected.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is substantially correct. The changes are as follows:

A. Whether the features upon which appellant relies are recited in the rejected claims. Although the claims are interpreted in light of the specification. Limitations from the specification are not read into the claims. *In re Van Guens, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993)*.

B. Whether the subject matter of claims 1-6, 8-18 and 20-24 would have been obvious to a person of ordinary skill in the art under the provisions of 35 USC 103(a) at the time the subject matter of those claims was made, based on the teachings of Fichou et al. (US#5,790,522).

C. Whether the subject matter of claim 25 would have been obvious to a person of ordinary skill in the art under the provisions of 35 USC 103(a) at the time the subject matter of those claims was made, based on the teachings of Fichou et al. (US#5,790,522) and Ljungberg et al. (US#5,493,566).

(7) Grouping of Claims

Appellant's brief does not include a statement for grouping of claims and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

The following is a listing of the prior art of record relied upon in the rejection of claims under appeal.

5,790,522	Fichou et al.	Aug. 04, 1998
5493,566	Ljungberg et al.	Feb. 20, 1996

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

A. Claims 1-6, 8-18 and 20-24 are rejected under 35 U.S.C. 103(a) as being patentable over Fichou et al. (US#5,790,522).

With respect to claims 1 and 13, Fichou et al. (US#5,790,522) discloses a method for congestion control within a switch having at least one input section that includes an input buffer (*receive adapters with buffers 42, shown in Figure 4*). The data is transmitted from the input section to an output section through a switching fabric (col. 6, lines 13-31 and Figure 4) and data transmission is paused when congestion is detected within the switching fabric or output section. Each adapter switch defines a period of time for pausing transmission (col. 8, lines 2-8). This period of time is chosen to be long enough so that premature transmission from an input queue does not cause

congestion again in the switch fabric. The time period is also chosen to be short enough so that data is not held for excessive periods in an input queue (col. 8, lines 18-25). It is clear that if data is held for too long in an input queue, eventually cell loss will result at the input side of the switch. Furthermore, the invention monitors the switch input queue sizes so as to compare them to certain thresholds (col. 9, lines 53-58). Fichou et al. does not expressly disclose that the time period is computed based on the monitored input queue sizes. However, at the time the invention was made, it would have been obvious to use the input queue size to determine the timer period. One of ordinarily skill in the art would have been motivated to use the queue size because it indicates how close a queue is to its maximum capacity, which would be needed in determining how long the system can delay restart before resulting in cell loss at the input.

The Applicant's attention is directed to the spacing function mechanism for the congestion control shown in Fig. 4, in which the space mechanism can be used to reduce the rate of transfer of data to the switch fabric. The spacing function causing received packets having other than the predetermined priority level to be transferred to the switch fabric at a transfer rate lower than the predetermined packet transfer rate of the switch (*controlling the delays between packets based upon input buffer occupancy*) (Col. 6, lines 60 plus). Furthermore, Figs. 7 and 8 discloses the buffer management mechanism and threshold controlled spacing mechanism to used in congestion control, in which the threshold controlled mechanism can be implemented in the adapter: switch input queues sizes are monitored and as soon as the number of cells queued reaches a threshold Te1, spacing is disabled; when a threshold Te2 is reached, the spacing is

enabled again (Col. 9, lines 54 plus). Furthermore, Fichou et al. (US#5,790,522) is applied herein merely for the teaching of the traffic congestion control utilizing separate queues and queuing delays (and jitter) for controlling the delays between packets, and downstream congestion is achieved. Fichou's congestion control system includes defining a threshold level for each of the input buffers in the receive adapter; monitoring the input buffer contents to detect when the contents of an input buffer exceed the defined threshold level; and enabling the transfer of packets at a rate lower than the predetermined packet transfer rate by allowing the spacing function to be enabled only while the buffer contents remain below the threshold level, otherwise disabling the spacing function to cause packets to be transferred at the predetermined packet transfer rate (*controlling the delays between packets based upon input buffer occupancy*) (Col. 12, lines 18 plus).

B. Claims 2-6, 8-12, 14-18 and 20-24 are rejected under 35 U.S.C. 103(a) as being patentable over Fichou et al. (US#5,790,522).

With respect to claims 2 and 14, Fichou et al. (US#5,790,522) further teaches that the data switch contains an output buffer (*queue*) and a backpressure signal generator within the switch fabric used when switch congestion is detected (col. 5, lines 15-20 and 30-32).

With respect to claims 3 and 15, Fichou et al. (US#5,790,522) further teaches that a backpressure signal indicates the existence of congestion conditions (col. 8, lines 26-27).

With respect to claims 4 and 16, Fichou et al. (US#5,790,522) further discloses that data transmission is paused when a backpressure signal is received, meaning congestion is detected (col. 8, lines 2-6).

With respect to claims 5 and 17, Fichou et al. (US#5,790,522) further teaches that in practice, congestion is detected when the output queue is full, meaning a high level of occupancy (col. 5, lines 15-18).

With respect to claims 6 and 18, Fichou et al. (US#5,790,522) further discloses that in practice, the output buffer is monitored and when congestion is detected, a congestion indication signal is generated (*backpressure*) and delivered to input section, which pauses data transmission (col. 5, lines l 5-l 8).

With respect to claims 8, 9, l 1, 20, 21 and 23, Fichou et al. (US#5,790,522) discloses spacing of cells for transmission to the switch fabric based on the fullness of input queues (col. 9, lines 51-63). Figure 7 shows two threshold levels, and Figure 8 demonstrates that more thresholds may be used, for example four threshold levels. Each threshold level corresponds to a different spacing between cells for transmission (col. 10, lines 37-50). As the queue becomes more full, the spacing becomes smaller until the queue reaches its fullest threshold, in which case the spacing is zero. This represents an inverse relationship between queue size and spacing between cells. Fichou does not expressly disclose using this threshold and spacing system in response to the backpressure signal resulting from congestion. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use a plurality of queue thresholds to determining the timer period between sending cells in response to the backpressure signal. One of ordinary skill in the art would have been

motivated to do this to provide an efficient way to prevent cell loss at an input queue, while leaving enough time for congestion in the switch to clear up.

With respect to claims 10 and 22, Fichou et al. (US#5,790,522) discloses a plurality of input buffers (see Figure 4).

With respect to claims 12 and 24, Fichou et al. (US#5,790,522) discloses a manager module (43), which represents the intelligent control device of the present invention.

C. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fichou et al. (US#5,790,522) in view of Ljungberg et al. (US#5,493,566).

Regarding to claim 25, Fichou et al. (US#5,790,522) discloses a method for congestion control within a switch having at least one input section that includes an input buffer (*receive adapters with buffers 42, shown in Figure 4*). The data is transmitted from the input section to an output section through a switching fabric (col. 6, lines 13-31 and Figure 4) and data transmission is paused when congestion is detected within the switching fabric or output section. Each adapter switch defines a period of time for pausing transmission (col. 8, lines 2-8). This period of time is chosen to be long enough so that premature transmission from an input queue does not cause congestion again in the switch fabric. The time period is also chosen to be short enough so that data is not held for excessive periods in an input queue (col. 8, lines 18-25). It is clear that if data is held for too long in an input queue, eventually cell loss will result at the input side of the switch. Furthermore, the invention monitors the switch input queue sizes so as to compare them to certain thresholds (col. 9, lines 53-58). Fichou et al.

(US#5,790,522) further discloses in Fig. 4 a block diagram illustrated a congestion control system includes defining a threshold level for each of the input buffers in the receive adapter; monitoring the input buffer contents to detect when the contents of an input buffer exceed the defined threshold level; and enabling the transfer of packets at a rate lower than the predetermined packet transfer rate by allowing the spacing function to be enabled only while the buffer contents remain below the threshold level, otherwise disabling the spacing function to cause packets to be transferred at the predetermined packet transfer rate (*controlling the delays between packets based upon input buffer occupancy*) (Col. 12, lines 18 plus). As shown in Fig. 4, the space mechanism can be used to reduce the rate of transfer of data to the switch fabric. The spacing function causing received packets having other than the predetermined priority level to be transferred to the switch fabric at a transfer rate lower than the predetermined packet transfer rate of the switch (*controlling the delays between packets based upon input buffer occupancy*) (Col. 6, lines 60 plus). Furthermore, Figs. 7 and 8 discloses the buffer management mechanism and threshold controlled spacing mechanism to used in congestion control, in which the threshold controlled mechanism can be implemented in the adapter: switch input queues sizes are monitored and as soon as the number of cells queued reaches a threshold Te1, spacing is disabled; when a threshold Te2 is reached, the spacing is enabled again (Col. 9, lines 54 plus).

However, Fichou et al. (US#5,790,522) does not disclose expressly the restart of data transmission from the input section to the output section is delayed without regard to a data priority. In the same field of endeavor, Ljungberg et al. (US#5,493,566) discloses a flow control system for packet switches that throttles traffic coming from

input buffers in response to output buffers reaching a threshold value without regard for priority (see Abstract and Figure 5). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to perform the function of delaying data transmission from the input queues of Fichou in accordance with the defined timer values without regard for priority. One of ordinary skill in the art would have been motivated to do this to prevent all cell loss, rather than trying to save higher priority cells by possibly discarding lower priority cells.

(11) Response to Argument

A. Response to appellant's argument: 35 USC 103(a) claims 1, 13 and 25, Fichou et al. (US#5,790,522): Appellant argues the propriety of the examiner's rejections under 35 USC 103, by taking the position that the emphasis of the invention is for "addresses problems caused by overload in buffer occupancy levels among input buffers" (Page 3, first paragraph). However, Fichou et al. (US#5,790,522) is applied herein merely for the teaching of the traffic congestion control utilizing separate queues and queuing delays (and jitter) for controlling the delays between packets, and downstream congestion is achieved. Fichou's congestion control system includes defining a threshold level for each of the input buffers in the receive adapter; monitoring the input buffer contents to detect when the contents of an input buffer exceed the defined threshold level; and enabling the transfer of packets at a rate lower than the predetermined packet transfer rate by allowing the spacing function to be enabled only while the buffer contents remain below the threshold level, otherwise disabling the spacing function to cause packets to be transferred at the predetermined packet

transfer rate (*controlling the delays between packets based upon input buffer occupancy*) (Col. 12, lines 18 plus). The Applicant's attention is directed to the spacing function mechanism for the congestion control shown in Fig. 4, in which the space mechanism can be used to reduce the rate of transfer of data to the switch fabric. The spacing function causing received packets having other than the predetermined priority level to be transferred to the switch fabric at a transfer rate lower than the predetermined packet transfer rate of the switch (*controlling the delays between packets based upon input buffer occupancy*) (Col. 6, lines 60 plus). Furthermore, Figs. 7 and 8 discloses the buffer management mechanism and threshold controlled spacing mechanism to used in congestion control, in which the threshold controlled mechanism can be implemented in the adapter: switch input queues sizes are monitored and as soon as the number of cells queued reaches a threshold Te1, spacing is disabled; when a threshold Te2 is reached, the spacing is enabled again (Col. 9, lines 54 plus).

B. Response to appellant's argument on the "input buffer capacity":

Appellant appears to be relying to the term "*input buffer capacity*" (Appeal Brief - Page 4, last paragraph and page 5, 1st-2nd paragraphs). In response, it is noted that the features upon which appellant relies (*input buffer capacity*) are not recited in the rejected claims. In data flow control system, It is important that the ***buffer occupancy*** always stays between zero and full ***buffer capacity***. In another word, the ***buffer occupancy*** may be, for example, simply the percent of ***buffer capacity*** occupied. Although the claims are interpreted in light of the specification. Limitations from the

specification are not read into the claims. *In re Van Guens, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).*

C. Response to appellant's argument on the claim limitations compared to the cited prior arts: With respect to the limitation wherein *"the duration of the computed delay interval varies inversely with the determined input buffer occupancy*" as admitted by the appellant for the cited prior art – T1 and T2 described within Fichou et al. (US#5,790,522). It appears that appellant is attempting to impose a rather definition in relationship to the traffic congestion control utilizing separate queues and queuing delays (and jitter) for controlling the delays between packets as discussed above. However, Fichou et al. (US#5,790,522) discloses spacing of cells for transmission to the switch fabric based on the fullness of input queues (Col. 9, lines 51-63). Figure 7 shows two threshold levels, and Figure 8 demonstrates that more thresholds may be used, for example four threshold levels. Each threshold level corresponds to a different spacing between cells for transmission (Col. 10, lines 37-50). As the queue becomes more full, the spacing becomes smaller until the queue reaches its fullest threshold, in which case the spacing is zero. This represents an inverse relationship between queue size and spacing between cells.

D. Claims 10 and 22: As for the claims 10 and 20, applicant's argument found persuasive. Therefore claim 10 and 20 are objected to as being dependent upon a rejected base claims 1, 9 and 13, 21 respectively, but would be allowable if rewritten in

independent form including all of the limitations of the base claims and any intervening claims.

E. Conclusion: For the above reasons, it is believed that the rejections of the claims 1-6, 8-9, 11-18 and 21-25 should be sustained.

Conferee's:

/Huy D. Vu/SPE

/Tommy Chin/SPRE

Respectfully submitted,

/Man Phan/

Primary Examiner, Art Unit 2475